

Bulletin of the Atomic Scientists

Not just Oppenheimer

How other scientists tried to change nuclear weapons policy for the better—and how some succeeded

By [Frank N. von Hippel](#)

MARCH 10, 2024

J. Robert Oppenheimer was the charismatic physicist who led the World War II project to design the Hiroshima and Nagasaki fission bombs and, after the war, was for five years the US government's leading technical advisor on nuclear weapons policy. His career as an advisor ended in 1954 after he recommended against developing 1,000-times-more-powerful thermonuclear bombs.

Oppenheimer was re-introduced to the public last year in the eponymous Christopher Nolan film that drew huge worldwide audiences and earned 13 Oscar nominations. He was not, however, the only scientist struggling with foreign policy and security issues once the world realized that nuclear explosives could be made. Many other scientists tried to influence nuclear weapons policy—and some did successfully.

Nuclear arms control

Niels Bohr

Niels Bohr was 60 in 1945 and second only to Einstein in fame among 20th-century physicists for explaining the energy levels of electrons in atoms, creating the Institute of Theoretical Physics in Copenhagen to which young physicists flocked from all over Europe to develop the new quantum mechanics, and then explaining nuclear fission.

After Bohr escaped from Nazi-occupied Denmark in 1943, he was invited to visit Los Alamos, where he learned that the United States was well on its way to making fission bombs.

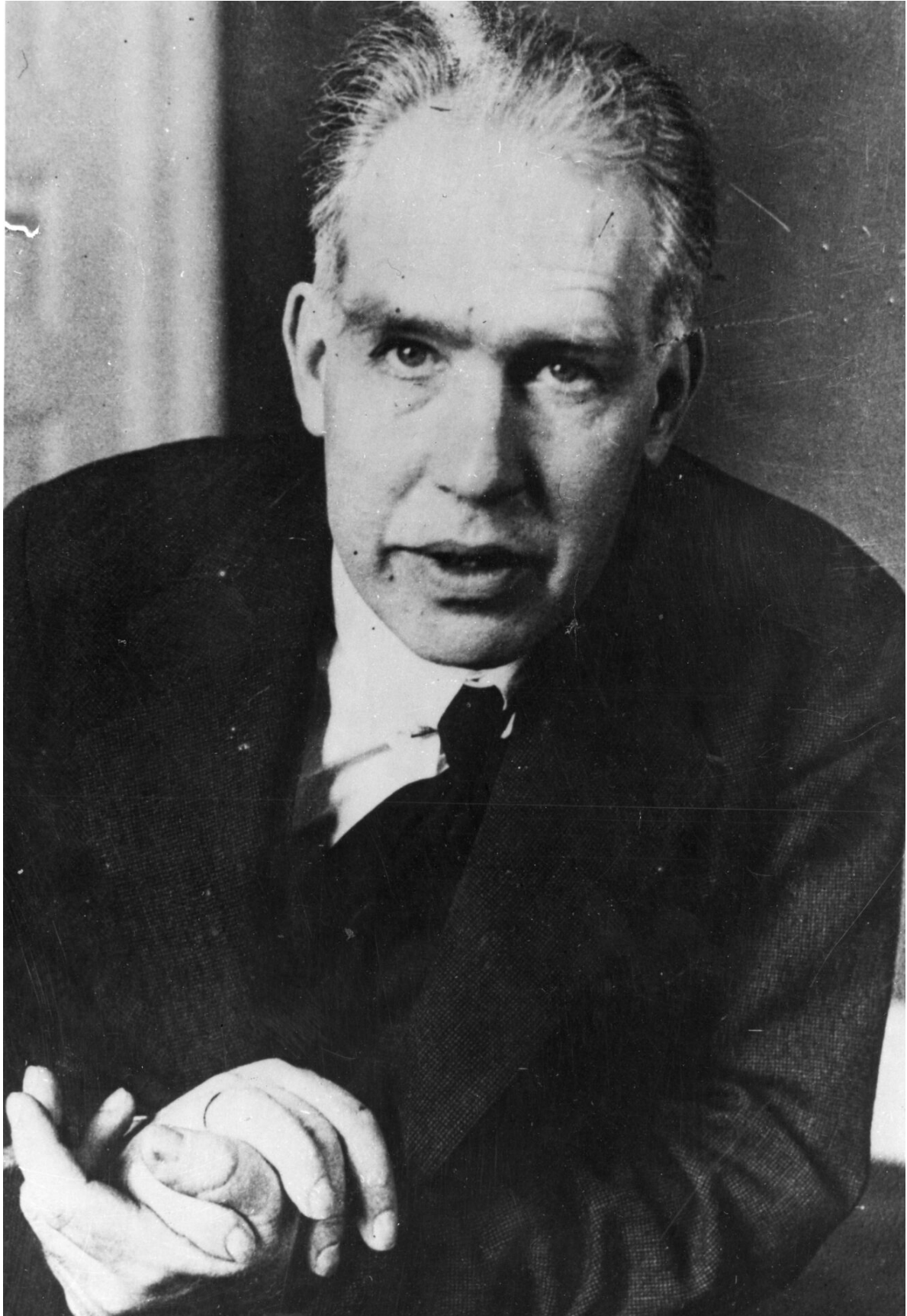
He focused immediately on the dangerous nuclear arms race that would result once the Soviet Union had the bomb. As was his wont, he engaged colleagues in prolonged, deep discussions which resulted in his concerns and ideas spreading among the physicists in the project. (In 1964,

two years after Bohr's death, Oppenheimer would record a magnificent appreciation of the impact of Bohr's concerns.)^[1]

In the summer of 1944, admirers obtained meetings for Bohr with both Prime Minister Winston Churchill and President Franklin D. Roosevelt. In a memo written for Roosevelt, Bohr summarized his proposal:

“[T]he terrifying prospect of a future competition between nations about a weapon of such formidable character can only be avoided through a universal agreement in true confidence [and] will therefore demand such concessions regarding exchange of information and openness about industrial efforts, including military preparations, as would hardly be conceivable unless all partners were assured of a compensating guarantee of common security against dangers of unprecedented acuteness... Personal connections between scientists of different nations might ... offer means of establishing preliminary and unofficial contact.”^[2]

Roosevelt expressed interest in Bohr's idea of talking with Stalin about the bomb, but Churchill vetoed it. The British prime minister was particularly irate at Bohr's suggestion that the basis for such a discussion could be laid by communications among Western and Soviet scientists. Fearing Bohr might leak nuclear secrets to the Soviet Union, Churchill told his science advisor, “Bohr ought to be confined or at any rate made to see that he is very near the edge of mortal crimes.”^[3]



Niels Bohr, December 1945. (AIP)

“Bohr ought to be confined or at any rate made to see that he is very near the edge of mortal crimes.”

—Winston Churchill

James Franck

Leo Szilard

Eugene Rabinowitch

Glenn Seaborg

The following year, Bohr’s efforts were picked up by a group of scientists at the Manhattan Project’s Metallurgical Laboratory (also known as the “Met Lab”) at the University of Chicago, where the US plutonium-production reactors were designed.

In May 1945, as the decision to use nuclear bombs on Japan was being finalized, Arthur Compton, director of the Met Lab, allowed James Franck, 63, to organize a study of the “social and political implications” of nuclear bombs. Franck, a German refugee, had been sensitized to the social responsibility of scientists, in part by Bohr, after allowing himself to be recruited into Germany’s World War I poison gas program.

The co-authors of the resulting “Franck Report”^[4] included the irrepressible genius, Leo Szilard, inventor of the nuclear chain reaction and co-designer with Enrico Fermi of the first nuclear reactor; Franck’s research collaborator, Eugene Rabinowitch, later founding editor of the *Bulletin of the Atomic Scientists*; and chemist Glenn Seaborg, 33, co-discoverer of plutonium and other “transuranic” elements (artificial elements heavier than uranium), and later, during the 1960s, chairman of the US Atomic Energy Commission.

The Franck Report argued for not bombing Japanese cities, assessing that a post-war nuclear arms race with the Soviet Union would be inevitable if the United States were to use nuclear bombs in a surprise attack on Japan. It urged instead that the atomic bomb be demonstrated to representatives of the United Nations, which had just had its founding meeting in San Francisco in April 1945, and that the UN be consulted on its use.

President Roosevelt had just died and the report went to the “Interim Committee” chaired by Secretary of War Henry Stimson, who asked Oppenheimer, Compton, Fermi, and Ernest Lawrence (head of Berkeley’s Radiation Laboratory) whether any demonstration of nuclear weapons could be as effective in convincing Japan to surrender as bombing Japanese cities. The four reported back, “We can propose no technical demonstration likely to bring an end to the war; we see no acceptable alternative to direct military use.”^[5]

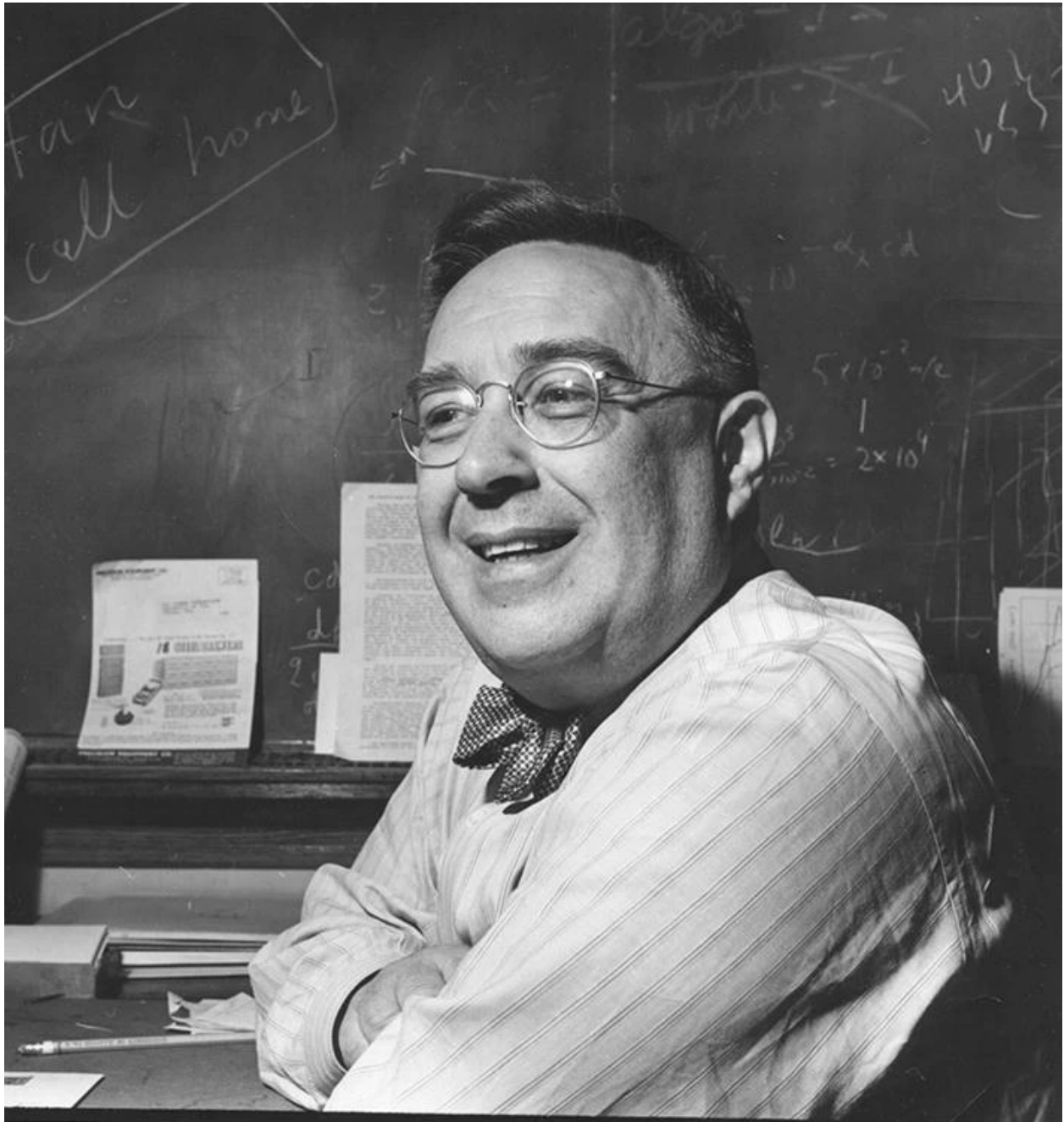
The Interim Committee's formulation of the question ignored, however, the lesson the Soviet Union would draw from a secret US-UK decision to use nuclear bombs in a surprise attack on an enemy.

Stalin had launched a nuclear-weapons development program in 1943, based on intelligence about the US-UK nuclear-weapons program. After the bombing of Hiroshima, however, Stalin gave the Soviet nuclear-weapons program a priority similar to that the United States had given when it was driven by fear of a Nazi nuclear bomb. Stalin reportedly told the leaders of his nuclear program, "Hiroshima has shaken the whole world. The balance has been destroyed!"^[6]

Bohr's concerns were correct.



James Franck (left) and Enrico Fermi worked together at the University of Chicago Metallurgical Laboratory during the Manhattan Project. (AIP)



The Franck Report was principally written by Eugene Rabinowitch, founding editor of the *Bulletin*. (Rabinowitch Family Archives)

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Metallurgical Laboratory

P.O. BOX 5207
CHICAGO 90, ILLINOIS

QC-2720
This document consists of 1 pages and 0 figures
No. 1 of 5 copies, Series A

BUFFINGTON 4500

June 12, 1945

To: Secretary of War - Attention: Mr. George Harrison

From: Arthur H. Compton

In re: Memorandum on "Political and Social Problems" from Members of the
"Metallurgical Laboratory" of the University of Chicago.

Dear Mr. Secretary:

I have submitted to you a memorandum which has been prepared on short notice by certain key members of the scientific staff of the Metallurgical Laboratory of the University of Chicago. It deals with the long-term consequences of use of the new weapons with which we are concerned. I am submitting this at the request of the Laboratory, for the attention of your Interim Advisory Committee. The memorandum has not yet been considered by other members of the "Scientific Panel." This will be done within a few days, and a report by the panel dealing with the matter in question will be submitted. In the meantime, however, because time is short for making the necessary decisions, I have personally taken the liberty of transmitting this memorandum to you for the consideration of your committee.

The main point of this memorandum is the predominating importance of considering the use of nuclear bombs as a problem of long-range policy rather than for its military advantage in this war. Their use should thus be directed primarily toward bringing about some international control of the means of nuclear warfare.

The proposal is to make a technical but not military demonstration, preparing the way for a recommendation by the United States that the military use of atomic explosives be outlawed by firm international agreement. It is contended that its military use by us now will prejudice the world against accepting any future recommendation by us that its use be not permitted.

I note that two important considerations have not been mentioned:

- (1) that failure to make a military demonstration of the new bombs may make the war longer and more expensive of human lives, and
- (2) that without a military demonstration it may be impossible to impress the world with the need for national sacrifices in order to gain lasting security.

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Arthur Compton's letter introducing the Franck Report to Secretary of War Stimson.

International brainstorming

Joseph Rotblat

Bertrand Russell

Albert Einstein

Joseph Rotblat was a Polish physicist on a fellowship in the United Kingdom when Hitler's army invaded Poland. Rotblat had already carried out an experiment in Poland that demonstrated the possibility of a chain reaction in uranium. In the United Kingdom, Rotblat helped start the British nuclear-weapon program and then joined Los Alamos when the British effort was folded into the US nuclear-weapon program.

Like the other refugee physicists from Europe, Rotblat acted out of fear that the Nazis might be the first to get nuclear bombs.

In 1944, after US intelligence had concluded that the Nazis never had a serious nuclear-weapons project, according to Rotblat, General Groves told a dinner group at Los Alamos that the new rationale for the US nuclear project was to “subdue” the Soviet Union. Rotblat decided to leave.^[7]

After his return to the United Kingdom, Rotblat pioneered the use of ionizing radiation to treat cancer. He also worked with Bertrand Russell, the British philosopher, mathematician, and public intellectual, to recruit eminent international scientists to endorse a manifesto Russell had written calling on scientists from around the world to “assemble in conference to appraise the perils that have arisen as a result of the development of weapons of mass destruction, and to discuss a resolution.”^[8] Albert Einstein's endorsement of Russell's manifesto was his last public act before his death in 1955, and it became known as the “Russell-Einstein Manifesto.”

Rotblat became the first secretary general of the Pugwash Conferences on Science and World Affairs, named after the village in Nova Scotia where the first meeting was held in 1957 to discuss how to reduce the danger of nuclear war. Through the 1980s, Pugwash working groups developed the technical bases for nuclear and also chemical, biological, and conventional arms control agreements. Rotblat and Pugwash shared the 1995 Nobel Peace Prize “for their efforts to diminish the part played by nuclear arms in international politics and, in the longer run, to eliminate such arms.”

Mikhail Gorbachev's policies of “glasnost” (openness) and “common security” owed an intellectual debt to Bohr and Pugwash. The circle around Gorbachev who advocated for the new approach to foreign and security policy called it the “new thinking”—inspired, according to Gorbachev's reformist foreign minister, Eduard Shevardnadze,^[9] by the lines in the Russell-Einstein manifesto:

“We have to learn to think in a new way. We have to learn to ask ourselves, not what steps can be taken to give military victory to whatever group we prefer, for there no longer are such steps; the question we have to ask ourselves is: what steps can be taken to prevent a military contest of which the issue must be disastrous to all parties?”



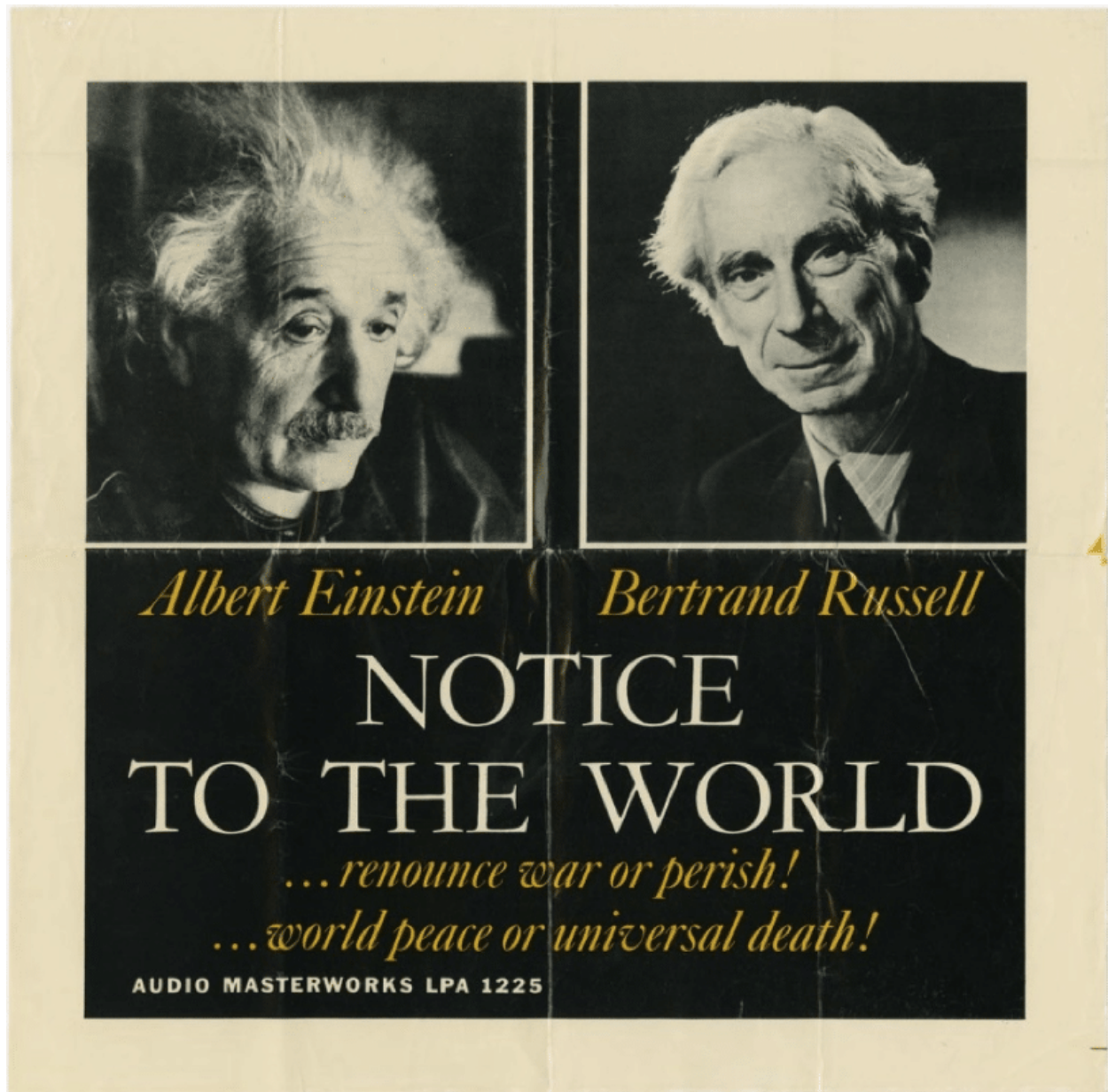
Joseph Rotblat with Soviet President Mikhail Gorbachev during a Pugwash workshop in Moscow, February 1995. (Pugwash)



Joseph Rotblat's Los Alamos ID badge photo. He left the Manhattan Project in 1944 on moral grounds, the only scientist to do so.

“We have to learn to think in a new way.”

—from the Russell-Einstein manifesto



Bertrand Russell and Albert Einstein's Manifesto

Civilian control of US nuclear research and development [\[10\]](#)

Federation of
Atomic Scientists

After the end of World War II, the younger scientists in the different installations of the Manhattan Project organized to educate their fellow citizens about the policy issues that would

have to be dealt with now that nuclear weapons had been created. Groups were organized at the University of Chicago's Met Lab; Los Alamos; Oak Ridge, Tennessee, where the US World War II uranium enrichment facilities had been built; and MIT's Radiation Laboratory, where US wartime radar development was based.

The first nuclear policy issue on Congress' agenda was how to manage post-war nuclear research and development.

The War Department (renamed the Defense Department in 1949) drafted a bill sponsored by Rep. Andrew May and Sen. Edwin Johnson. The younger atomic scientists feared the bill would result in even academic nuclear research being subject to military secrecy, but Oppenheimer, Fermi, and Lawrence signed a letter urging the bill's rapid passage, creating a temporary split between the senior and younger scientists.

The site organizations sent representatives to Washington to present their views. Within a month, they had established a small volunteer-staffed office and created the Federation of Atomic Scientists (later renamed Federation of American Scientists). Members of Congress and journalists were eager to meet the young articulate atomic scientists and learn about their concerns.

By the end of 1945, the May-Johnson bill was bogged down in controversy and an alternative bill emerged that put control of nuclear energy under a civilian-led Atomic Energy Commission. This was a success. The influence of the atomic scientists on policy quickly faded, however, after as public interest subsided and the scientists returned to research and teaching.

After the Soviet Union's first nuclear test in August 1949, Washington hunted for who had revealed the secret of the bomb to the Soviets. The scientists responded that the key secret—that fission bombs could be made—had been revealed in the bombings of Hiroshima and Nagasaki. And a report commissioned by General Groves, the War Department's overseer of the Manhattan Project, had also revealed how the United States enriched uranium and produced plutonium.^[11] But US officials were not convinced: There must have been a mole among atomic scientists.

In 1950, Klaus Fuchs, who had been a member of the British delegation in Los Alamos during World War II, confessed to sharing information with the Soviets, including the design of the Nagasaki bomb. Nuclear scientists who advocated nuclear arms control agreements with the Soviet Union then came under heavy surveillance. The FBI's investigative files on the Federation of American Scientists grew,^[12] and the organization went into decline until it was revived in 1970 under the presidency of mathematician Jeremy Stone.^[13]

" . . . We can afford to split the atom, but we can't afford to split the Big Three."

**The Hollywood Independent Citizens Committee of the Arts,
Sciences and Professions**

presents the statement of the

FEDERATION OF ATOMIC SCIENTISTS

We recognize that:

1. There has been unleashed in the atomic bomb the most destructive force known to mankind, against which there can be no military defense and in the production of which the United States can have no enduring monopoly.
2. Any effort to formulate our foreign policy on the basis of a temporary superiority in atomic weapons will force other nations as well as ourselves into an atomic armaments race, thereby creating a world of fear and hatred in which both great and small nations will face sudden destruction.
3. Domestic policy must free scientific investigation and discussion, and public surveillance and criticism of the application of atomic energy is the best guarantee that peace will be secured, that competition in devastating armaments will be ended, and that the public will be given full use of scientific developments which, furthered under government sponsorship, belong to the people that this government represents.

We therefore urge that:

1. A system of international control and cooperation be established in order to safeguard world peace. We urge that the President of the United States immediately invite the governments of Great Britain and the Soviet Union to a conference in order to discuss the common danger created by atomic weapons and to plan for a joint approach by these three great nations to the other members of the United Nations' Organization to the end of establishing a system of international cooperation and control of atomic energy which will prevent a competitive armaments race, safeguard world peace, and make available to all peoples the peacetime benefits of atomic energy.
2. A domestic policy on the control and development of atomic energy, in harmony with an international system of control and cooperation, be established by the President and the Congress of the United States providing for scientific freedom and the peacetime utilization of atomic energy in the interests of the people as a whole.

PROGRAM OF ACTION

- (1) **Write to your Congressman and President Truman demanding an immediate conference of the Big Three on Atomic Power and a joint approach to the United Nations to establish a system of international cooperation and control of atomic energy.**
- (2) **Write your Congressman that you are opposed to the May-Johnson Bill which does not allow for freedom of scientific research, for international control of the bomb and for government control of patents, and demand proper legislation.**

Issued by The Hollywood Independent Citizens Committee of the Arts, Sciences and Professions
1575 Crossroads of the World

HOLLYWOOD 6325

Scientists of the Manhattan Project formed the Federation of Atomic Scientists in 1945 to advocate for international and peaceful control of atomic energy. (Oregon State University Special Collections)

The influence of the atomic scientists on policy quickly faded as public interest subsided and the scientists returned to research and teaching.

Driving nuclear tests underground

With the development of the much more powerful thermonuclear weapons, atmospheric nuclear testing became a political issue. For high-yield thermonuclear tests, the United States moved its testing from Nevada to the Marshall Islands in the middle of the Pacific, while the Soviet Union moved its high-yield testing to the remote Arctic islands of Novaya Zemlya.

In 1954, winds blew the radioactive fallout from the US 15-megaton Bravo test on Bikini atoll in an unpredicted direction, contaminating an inhabited atoll, Rongelap, and a Japanese fishing boat, Lucky Dragon No. 5.

Fortunately, the residents of Rongelap were on its southern islands, where the fallout was 10 times less than on the northern islands, and were evacuated before they received lethal doses.^[14] However, many children developed thyroid tumors, the population suffered additional health problems, and the atoll was eventually abandoned.

All this was successfully hushed up by the United States, but the Japanese fishing boat returned to Japan with its crew suffering from severe radiation illness, with one death resulting. Their fish was radioactively contaminated. A global furor resulted.

The high doses received by the Rongelap islanders and the Japanese fishermen were from local radioactive fallout. Roughly half of the radioactivity from Soviet and US high-yield nuclear tests ended up in the stratosphere, however, from which it slowly filtered down globally. A community effort in St. Louis collected 320,000 baby teeth and found easily measurable levels of strontium-90, a 30-year half-life radioactive fission product with a biological uptake similar to calcium.^[15]

Linus Pauling

Andrei Sakharov

Two scientists, Linus Pauling in the United States and Andrei Sakharov in the Soviet Union, pointed out that huge quantities of radioactive carbon 14 also were being created by neutron absorption in atmospheric nitrogen. They estimated that millions of cases of serious health effects would result during that isotope's long decay period (half-life of 5,600 years).^[16]

In 1957, Pauling and his allies collected the signatures of 11,000 scientists on a petition calling for the end of nuclear testing in the atmosphere. In 1960, he was subpoenaed to testify before the US Senate Internal Security Subcommittee and questioned about whether his efforts were Communist-abetted.^[17]

In 1961, at a meeting of Premier Khrushchev with the leadership of the Soviet nuclear program, Sakharov addressed Khrushchev to argue that most of the planned Soviet high-yield tests were

unnecessary. According to Sakharov's recollection, Khrushchev responded that that the tests were necessary to deter US nuclear threats and told Sakharov, "I'd be a jellyfish and not Chairman of the Council of Ministers if I listened to people like Sakharov!"^[18]

Two years later, after the Cuban Missile Crisis, however, President John F. Kennedy and Khrushchev signed the Limited Test Ban Treaty, which banned nuclear tests everywhere but underground. That same year, Pauling was awarded the Nobel Peace Prize for his contribution. Sakharov's efforts as an insider were relatively invisible to the outside world, but, in 1975, he too received the Nobel Peace Prize recognizing "his struggle for human rights in the Soviet Union, for disarmament and cooperation between all nations."^[19]



Linus Pauling, 1954 Nobel prize winner for chemistry, holds up a sign opposing atmospheric nuclear testing at a rally near the White House, April 28, 1962. (AIP Emilio Segrè Visual Archives)

“I’d be a jellyfish and not Chairman of the Council of Ministers if I listened to people like Sakharov!”

—Nikita Khrushchev



Soviet physicist Andrei Sakharov twice appeared on the cover of Time magazine—first in 1977, two years after he won the Nobel Peace Prize, and again in 1990, a few months after his death.

Limiting ballistic missile defense

Richard Garwin

Hans Bethe

Paul Doty

Mikhail Millionshchikov

In 1967, President Lyndon B. Johnson decided the United States would deploy defenses against incoming ballistic missiles. Johnson’s decision came despite his science advisors arguing that the

system being proposed could easily be countermeasured and would provoke a Soviet nuclear buildup in response.^[20]

Johnson was under political pressure at the time from the Republican presidential candidate, Richard Nixon, who claimed the Soviet Union was ahead in ballistic missile defense. Johnson later decided not to run for reelection because of the unpopularity of the Vietnam war, and Nixon got elected the next year.

The Nixon administration inherited the Johnson administration plan, which would have proceeded as planned but for two facts. First, in the absence of today's homing technology, the long-range space interceptors were equipped with nuclear warheads 300 times more powerful than the bomb dropped on Hiroshima.^[21] Second, the Defense Department decided to base the nuclear-armed interceptors in the suburbs of major US cities—starting with Boston, Chicago, Dallas, Detroit, Honolulu, New York City, Salt Lake City, and Seattle.

This deployment resulted in “not-in-my-backyard” (NIMBY) uprisings by suburbanites living near the proposed deployment sites who felt at risk of accidental nuclear explosions of the interceptor warheads.

Two senior government science advisors, Richard Garwin and Hans Bethe, decided to publish in *Scientific American* their arguments about the many ways in which a country like the Soviet Union, with the level of technology required to build intercontinental ballistic missiles, could equip them with decoys and other countermeasures to confuse or blind the radars guiding the interceptors.^[22] Other scientists argued more generally that the deployment of defenses would provoke offensive buildups to still higher levels. In fact, that happened with the development of missiles with multiple independently targetable warheads in anticipation of missile defenses.

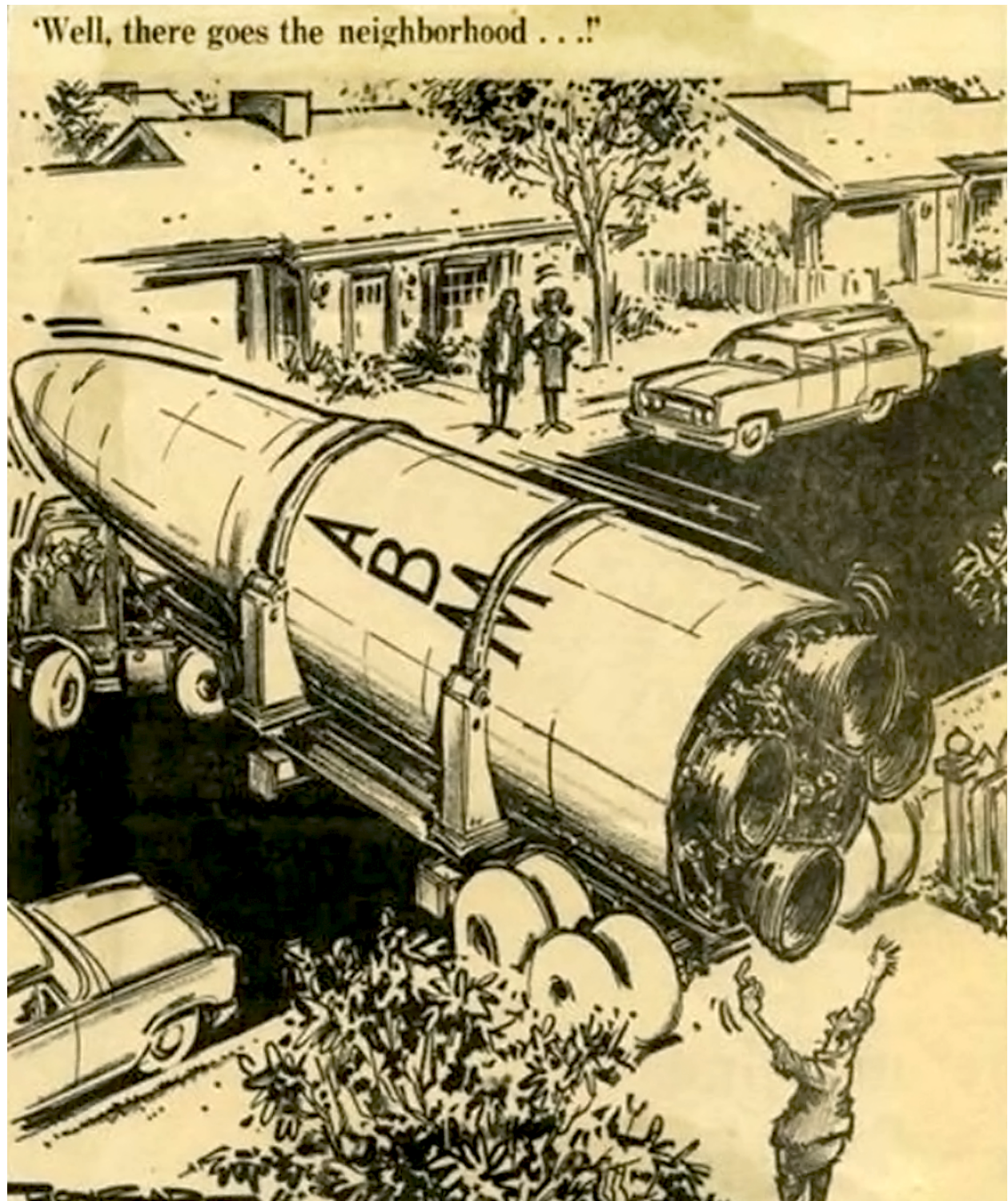
The Garwin-Bethe article made the issue accessible to members of Congress who had become interested in the issue because of the NIMBY uprisings. In response, the Nixon administration hastily moved the interceptors away from the cities and renamed the system “Safeguard.” But the Senate Foreign Relations Committee held hearings anyway, inviting the scientist critics as well as Defense Department officials to testify, and Congressional opinion shifted against the system.

It took a tie-breaking vote by Vice President Spiro Agnew, about a year into the new administration, to win Senate approval for funding to construct the first two interceptor sites. The Nixon administration saw the writing on the wall and decided to use the Safeguard system as a bargaining chip to be negotiated away with the Soviets.

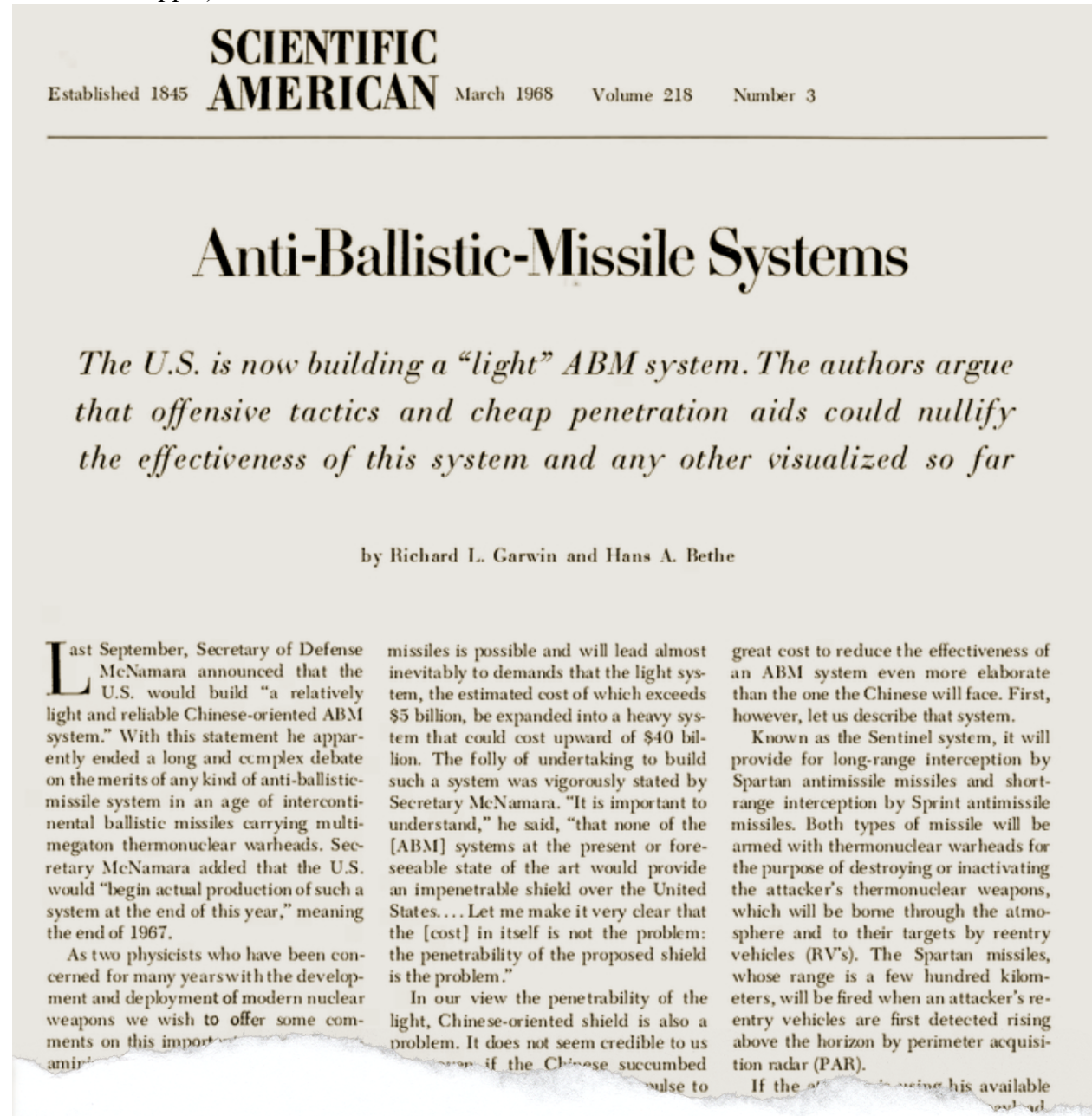
The 1972 Anti-Ballistic Missile (ABM) Treaty with its 1974 protocol limited the United States and Soviet Union each to one interceptor site with 100 interceptors—a hardly significant number given that the each country was on its way to 10,000 nuclear warheads deployed on long-range ballistic missiles.

At first reluctant to agree to limitations on defensive systems, the Soviet leadership came to accept the merits of an ABM Treaty, in part thanks to discussions between US and Soviet scientists. Arguments similar to those made by Garwin and Bethe had circulated in discussions at

Pugwash meetings in the mid-1960s and in bilateral meetings of the so-called Soviet-American Disarmament Study Group, organized by Harvard chemist Paul Doty in collaboration with Mikhail Millionshchikov, vice president of the Soviet Academy of Sciences. Shortly before his death in 1972, Millionshchikov drafted a report to the Academy crediting the ABM Treaty and other agreements to those informal discussions.^[23]



Editorial cartoon about the "not-in-my-backyard" movement opposition to the Johnson Administration proposed deployment of nuclear-armed ballistic missiles in US suburbs. (via Frank von Hippel)



The Soviet leadership came to accept the merits of an ABM Treaty, in part thanks to discussions between US and Soviet scientists.

The Comprehensive Nuclear Test Ban Treaty

Evgeny Velikhov

Thomas Cochran

Aaron Tovish

Charles Archambeau

The end of the US-Soviet nuclear arms race was made possible by a series of different events, including, in the United States, a grass-roots uprising calling for a “freeze” on the nuclear arms race in the early-1980s and, in the Soviet Union, the choice by the Soviet Communist Party’s Politburo of Mikhail Gorbachev as its next general secretary in 1985.

Gorbachev’s first nuclear arms control initiative was to declare a unilateral Soviet test moratorium to begin on August 6, 1985 (Hiroshima Day). His hope was to turn the Kennedy-Khrushchev Limited Test Ban Treaty into a Comprehensive Nuclear Test Ban Treaty by ending underground nuclear testing as well.

When the Reagan administration refused to join the moratorium, physicist Evgeny Velikhov, who had succeeded Millionshchikov as vice president of the Soviet Academy of Sciences and was an arms control advisor to Gorbachev, searched for a way forward. In October 1985, at the centennial celebration of Niels Bohr’s birth in Copenhagen, Velikhov suggested to me the idea of inviting an outside group to verify that Soviet testing had stopped.

Thomas Cochran, a physicist with the US Natural Resources Defense Council, was interested and had the backing of the chairman of the Council’s board, and Aaron Tovish, then with Parliamentarians for Global Action, had found a seismologist, Charles Archambeau, who was able to recruit a team of seismologists from the University of California, San Diego to monitor the Soviet Semipalatinsk Test Site in Kazakhstan. After a first meeting in Moscow in May 1986, the effort moved quickly and, in July, the seismologists set up a monitoring station at the first of three geologically favorable locations around the test site.^[24]

This initiative immediately excited test ban advocates in Congress.

The effort to achieve a Comprehensive Nuclear Test Ban Treaty had failed two decades earlier because of Soviet unwillingness to allow as many on-site investigations of suspect seismic events as the United States was demanding. Now a new Soviet leadership was allowing a US group to establish in-country monitoring stations—unilaterally! Congress began to press the Reagan and then George H.W. Bush administrations for test-ban negotiations and finally, in 1992, imposed a moratorium on US nuclear testing as long as other countries—especially Russia—did not test.^[25]

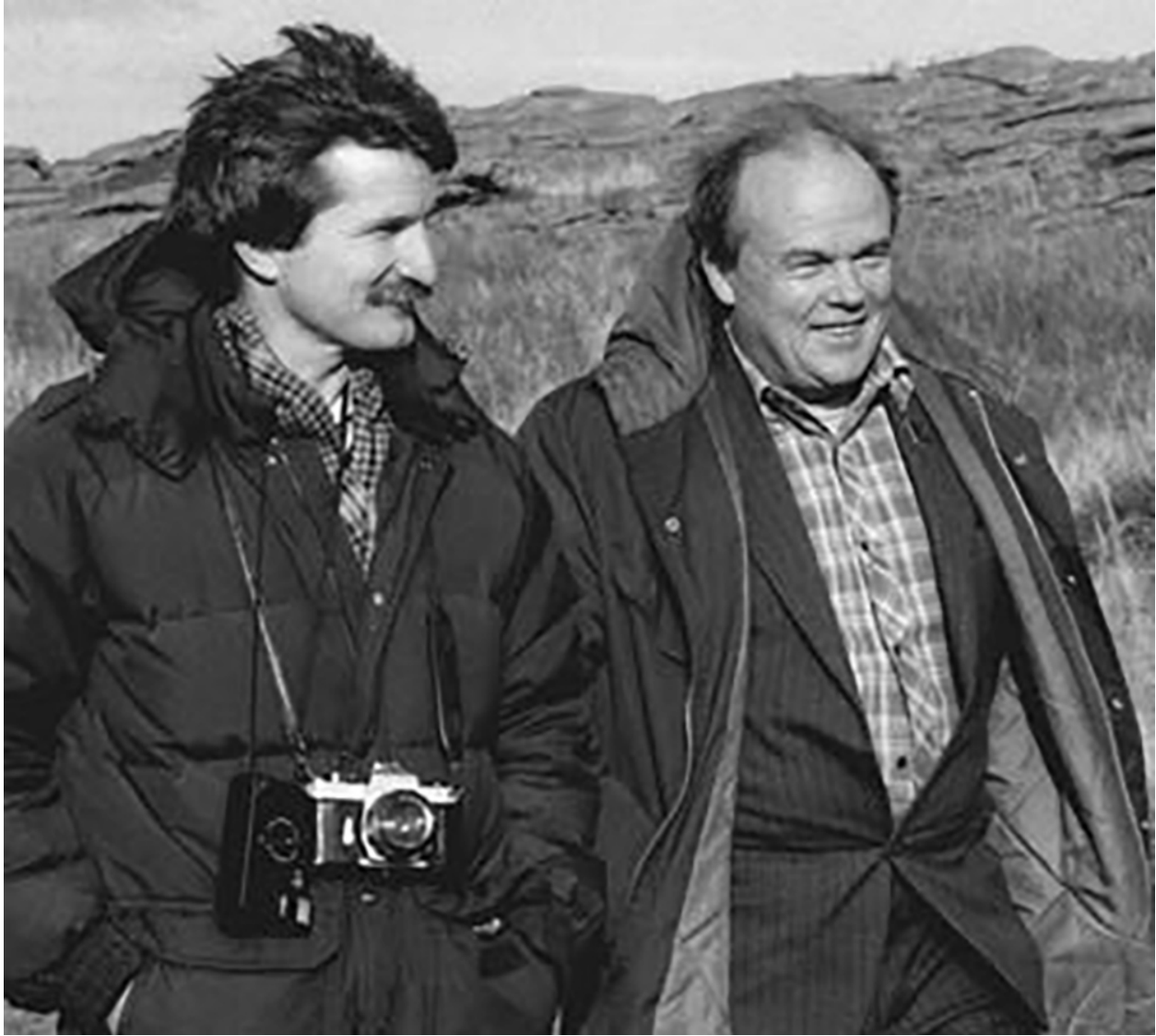
Serious negotiations followed on a Comprehensive Nuclear Test Ban Treaty that was opened for signatures in 1996. To date, the treaty has been ratified by 177 states, but it has not yet come into force because Annex 2 of the treaty requires ratifications by 44 specific countries.^[26] Among the nine nuclear-weapon states whose ratifications are required, only France and the United Kingdom have done so. China, Israel, Russia, and the United States have all signed, however, and the Vienna Convention on Treaties requires countries that have signed a treaty to comply

with it unless they unsign. India and Pakistan have not signed but have not tested since 1998. North Korea, which also has not signed, has not tested since 2017.

The different issues above show that, when there is public interest, scientists' efforts to advance nuclear arms control have been able to change policies. Unfortunately, since the end of the Cold War, public and therefore congressional interest in nuclear arms control have waned, and the nuclear military-industrial complex has taken back control of nuclear weapons policy in the United States.

With Russian President Vladimir Putin's thinly-veiled nuclear threats, China's nuclear-weapons buildup, and non-nuclear-armed states pressing for the Treaty on the Prohibition of Nuclear Weapons, however, nuclear arms control is becoming salient again. Will public interest meet this historical moment?

Editor's note: In October 2023, the US Physicists Coalition for Nuclear Threat Reduction, which has about a thousand members, convened a meeting at the International Center for Theoretical Physics in Trieste, Italy, to explore the possibilities for an international mobilization of physicists. This article is based on a talk given at that meeting. The author thanks Matthew Evangelista, author of Unarmed Forces: The Trans-national Movement to End the Cold War (Cornell University Press, 1999), who also gave a talk at that Trieste meeting, for his comments and suggestions.



Evgeny Velikhov (right) with Thomas Cochran of the US Natural Resources Defense Council at a Soviet test site in Kazakhstan in 1986. (Photo from RIA Novosti)



Seismologist Charles Archambeau sits in front of a large map of the Soviet Union. (University of Colorado at Boulder / AIP Emilio Segrè Visual Archives, Physics Today Collection)

The initiative immediately excited test ban advocates in Congress.



A team of seismologists sponsored by the Natural Resources Defense Council setting up portable surface seismometers near the Soviet Semipalatinsk test site in Kazakhstan, July 1986. (NRDC)

Notes

[1] “Robert Oppenheimer at UCLA,” May 14, 1964. [[LINK](#)]

[2] “Niels Bohr's Memorandum to President Roosevelt,” July 1944. [[LINK](#)]

[3] Richard Rhodes, *The Making of the Atomic Bomb* (Simon and Schuster, 1986), 525-538.

[4] *A Report to the Secretary of War* (the “Franck Report”), 11 June 1945. The May 1, 1946 edition of the *Bulletin of the Atomic Scientists* featured the declassified version of the June 1945 Franck Report. Also linked to in Alex Wellerstein, “To Demonstrate or not to Demonstrate,” March 6, 2015. [[LINK](#)]

[5] “To demonstrate, or not to demonstrate.” Ibid.

[6] David Holloway, *Stalin and the Bomb* (Yale University Press, 1994), 132.

[7] Joseph Rotblat, “Leaving the bomb project,” *Bulletin of the Atomic Scientists*, August 1985, pp. 16-19. [[LINK](#)]

[8] “The Russell-Einstein Manifesto,” July 9, 1955. [\[LINK\]](#)

[9] Eduard Shevardnadze, *The Future Belongs to Freedom*, translated by Catherine A. Fitzpatrick (New York: Free Press, 1991), 46.

[10] Alice Kimball Smith, *A Peril and A Hope: The Scientists' Movement in America, 1945-47* (University of Chicago Press, 1965).

[11] Henry DeWolf Smyth, *Atomic Energy for Military Purposes*, 1945, with a preface by General Groves. [\[LINK\]](#)

[12] Jessica Wang, *American Science in an Age of Anxiety: Scientists, Anticommunism and the Cold War* (University of North Carolina Press, 1999).

[13] Matt Schudel, “Jeremy Stone, arms-control advocate who led activist science group, dies at 81,” *Washington Post*, January 5, 2017. [\[LINK\]](#)

[14] Samuel Glasstone and Philip J. Dolan, *The Effects of Nuclear Weapons*, 3rd edition (Departments of Defense and Energy, 1977), 437.

[15] “St. Louis Baby Tooth Survey, 1959-1970.” [\[LINK\]](#)

[16] Frank N. von Hippel, “The Long-Term Global Health Burden from Nuclear Weapon Test Explosions in the Atmosphere: Revisiting Andrei Sakharov’s 1958 Estimates,” *Science & Global Security* Vol. 30 (2022) pp. 54-61, [\[LINK\]](#)

[17] *Testimony of Dr. Linus Pauling, hearings before the United States Senate Committee on the Judiciary, Subcommittee to Investigate the Administration of the Internal Security Act and Other Internal Security Laws*, Part 1, June 21, 1960. [\[LINK\]](#); Part 2, October 11, 1960. [\[LINK\]](#)

[18] Andrei Sakharov, *Memoirs* (New York: Alfred A. Knopf, 1990), 217.

[19] “The Nobel Peace Prize 1975.” [\[LINK\]](#)

[20] Joel Primack and Frank von Hippel, *Advice and Dissent, Scientists in the Political Arena* (Basic Books/New American Library, 1974), chapters 5, 13. [\[LINK\]](#)

[21] *Atomic Audit*, Stephen I. Schwartz, ed. (Brookings Institution Press, 1998), 287.

[22] Richard L. Garwin and Hans A. Bethe, “Anti-Ballistic-Missile Systems,” *Scientific American*, March 1968. [\[LINK\]](#)

[23] “Proekt (dokladnyi zapiski) v Prezidium Akademii nauk SSSR ob itogakh 15-ti letnei deiatelnosti Paguoshskogo dvizheniia uchenykh,” September 24, 1972. M. Millionshchikov papers, fond 1713, opis’ 2, delo I.5.2, no. 209, Archive of the Academy of Sciences of the Russian Federation. Obtained from Matthew Evangelista.

[24] Thomas B. Cochran, “The NRDC/Soviet Academy of Sciences Joint Nuclear Test Ban Verification Project,” April 20, 1987. [[LINK](#)]

[25] The Clinton administration decided to forego up to 15 tests allowed by the legislation to deal with any issues related to nuclear warhead reliability or safety. See Frank von Hippel, “The Decision to End U.S. Nuclear Testing,” *Arms Control Today*, December 2019. [[LINK](#)]

[26] Comprehensive Test Ban Treaty Organization, *Status of Signature and Ratification*. [[LINK](#)]
